FIELD APPLICATION OF ON-LINE COAL FLOW BALANCING TECHNOLOGY

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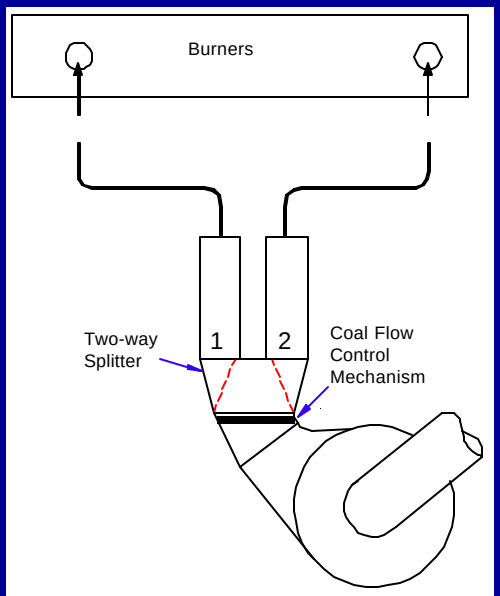
REASONS FOR COAL FLOW BALANCING

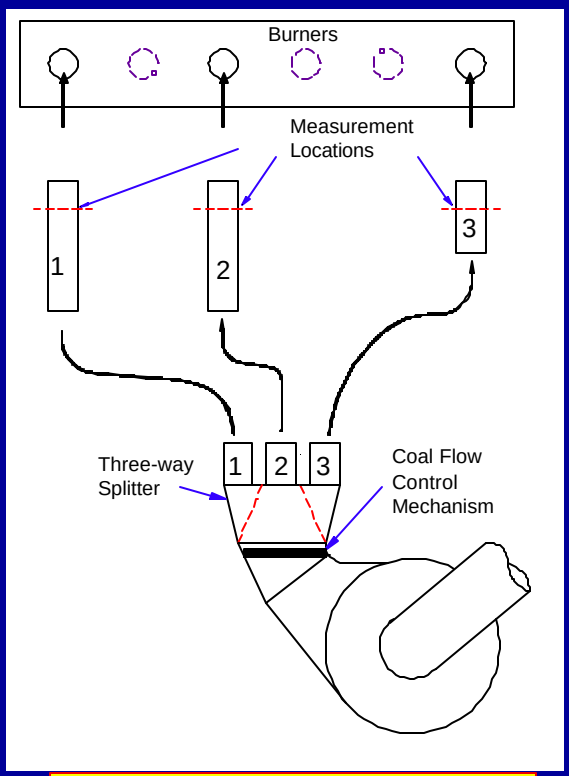
- Improve Performance - Reduce Emissions
  - Unburned Carbon
  - NO_x
  - CO
  - ESP Performance
  - Steam Temperatures
- Reduce Maintenance Costs
  - Localized Slagging and Waterwall Wastage
  - Coal Pipe Plugging - Windbox Fires
  - Damage to Burner Tips
  - Slag Buildup on Burners
  - Coal Pipe Erosion

FIELD TESTS WERE PERFORMED IN TWO WALL-FIRED UNITS FOR TWO- AND THREE-WAY RIFFLERS

- Modified ASME and Dirty Air Probes were Used for Coal and Air Flow Measurements, Respectively
- Coal Flow Balance Within +/- 5 Percent
- Negligible Impact on Air Flow Distribution



Two-Way Splitter with a Riffler



Three-Way Splitter with a Riffler

OBJECTIVES

- Close Control Over Coal Flow Distribution
- Negligible Impact on Air Flow Distribution
- On-Line Adjustments (Manual or Automated)

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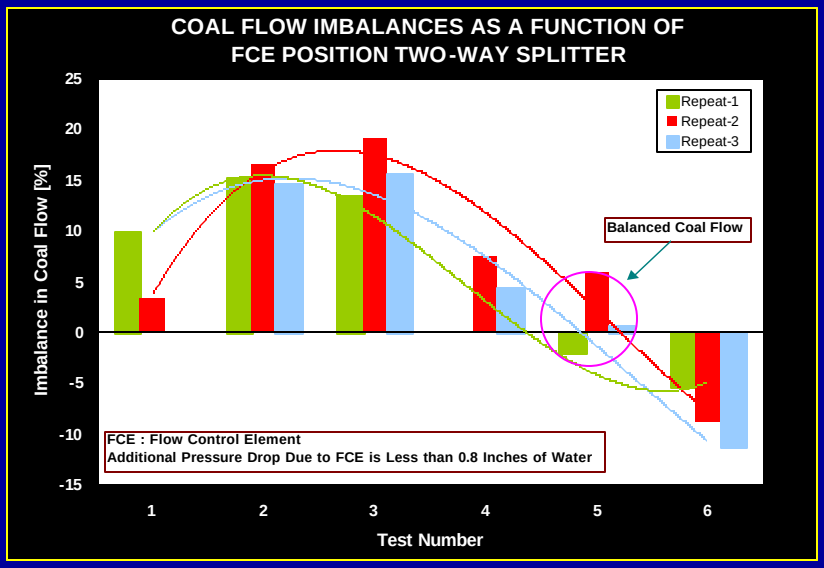
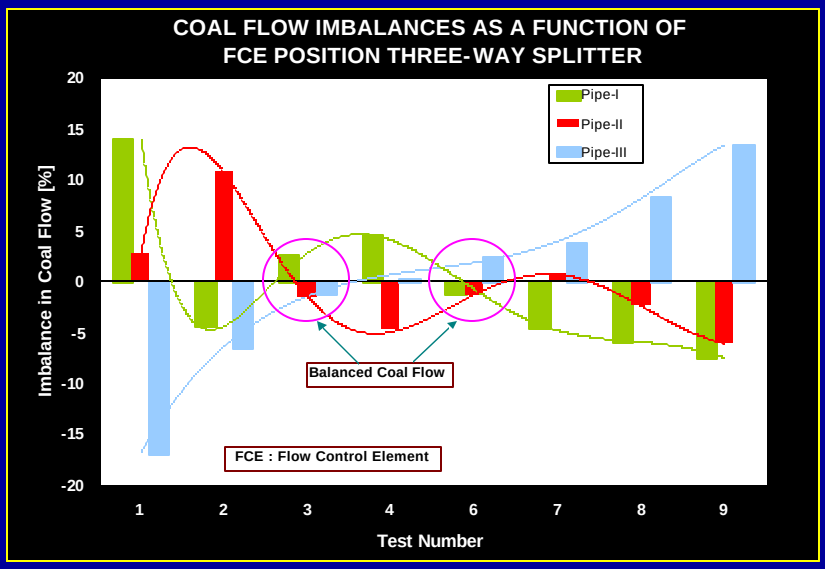
FIELD TEST RESULTS – TWO-WAY SPLITTER WITH FCE

- Pipe-to-Pipe Coal Flow Imbalances were Varied from as much as + 20 Percent to as low as – 10 Percent as Adjustments were Made to the FCE Position.
- The Effect of FCE Position on Primary Air Flow Rate was Almost Negligible. Less than 3 Percent Change was Observed in Primary Air Flow Rate.
- Additional Pressure Drop Due to FCE was Measured Between 0.4 and 0.8 Inches of Water.
- Visual Observations Indicated Considerable Changes in the Flame Color as a Function of the FCE Position.





FIELD TEST RESULTS – THREE-WAY SPLITTER WITH FCE

- Flow Control Mechanism Improved Pipe-to-Pipe Coal Flow Imbalances From –18 Percent Less than 1 Percent in Pipe III.
- A Balanced Coal Flow Distribution was Achieved For Two Different Positions of FCE.
- Results Indicated that Coal Flow Distribution Among Outlet Pipes Could be Varied as Needed.

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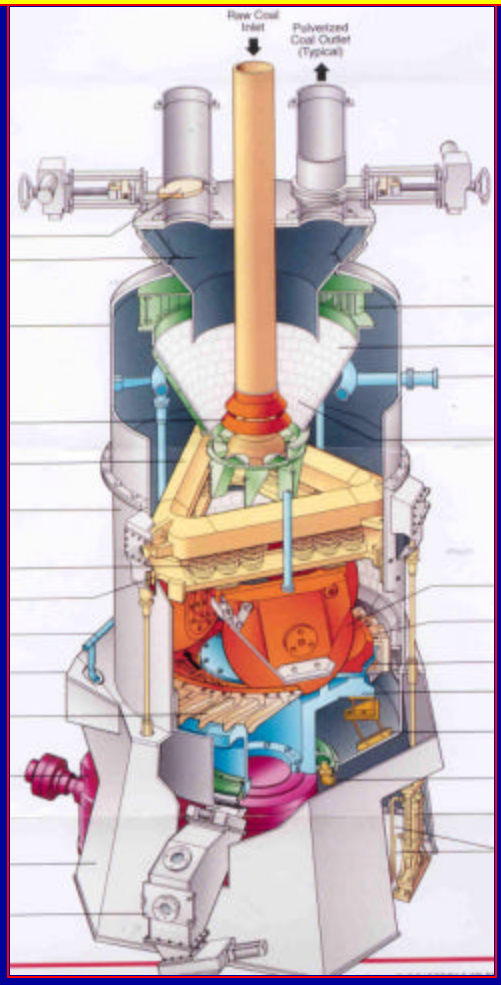
FUTURE WORK – COAL FLOW CONTROL IN PRESSURIZED VERTICAL SPINDLE MILLS



CONCLUSIONS AND FUTURE WORK

- Field Tests Confirmed that Coal Flow Control Mechanism Developed by the Energy Research Center Could Balance the Coal Flow Among Outlet Pipes Within +/- 5 Percent.
- The Insensitivity of Air Flow Distribution to FCE Setting Greatly Simplifies the Balancing Process.
- Implementation of this Technology in Coal-Fired Power Plants to Investigate the Effect of Coal Flow Balancing on Overall Combustion Efficiency and Emissions.
- Developing a New Technology to Balance Coal Flows in Vertical Pressurized Mills Using Similar Flow Fundamentals.

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